FOUNDATION & HIGHER

HIGHER EXTENDS

Name ..... Class .....

R13: Proportion equations

Construct and reason with equations of proportion

20 marks · 25 minutes · Non-calculator

1) y is directly proportional to x, and $y = 12$ when $x = 3$. Show that $y = 4x$

[Question 1: 2 marks]

2) Explain why "y is inversely proportional to x" can be written $y = \frac{k}{x}$

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[Question 2: 1 marks]

3) y is directly proportional to x^2, and $y = 50$ when $x = 5$. Show that $k = 2$ and find y when $x = 3$

[Question 3: 3 marks]

4) Ben writes "y is inversely proportional to x^2" as $y = kx^2$. Explain his mistake.

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[Question 4: 2 marks]

5) T is inversely proportional to d, and $T = 6$ when $d = 4$. Show that $T = 3$ when $d = 8$

[Question 5: 2 marks]

6) Explain why $\frac{y}{x}$ is constant when y is directly proportional to x.

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[Question 6: 2 marks]

7) Show that the table fits $y = 3x^2$.

x	1	2	3
y	3	12	27

[Question 7: 2 marks]

8) v is directly proportional to $\sqrt{w}$, and $v = 10$ when $w = 25$. Show that $v = 14$ when $w = 49$

[Question 8: 2 marks]

9) y is inversely proportional to x. What happens to y when x is halved? Explain.

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[Question 9: 2 marks]

10) Write a formula for "P is inversely proportional to the cube of r". Explain what the constant represents.

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[Question 10: 2 marks]

End of paper – 20 marks in total

Answers and brief mark scheme

Q	Answer	Method / notes
1	Shown	$12 = 3k$ (M1); C1.
2	Explanation	$y \times x$ is constant, k (C1).
3	Shown; 18	$50 = 25k$ (M1); $k = 2$ (C1); $y = 18$ (B1).
4	$y = \frac{k}{x^2}$	Inverse means divide by x^2 (C1); B1.
5	Shown	$k = 24$ (M1); C1.
6	Explanation	$y = kx$ so $\frac{y}{x} = k$ (C2).
7	Shown	Check all three values (M1); C1.
8	Shown	$v = 2\sqrt{w}$ (M1); C1.
9	Doubles	$y = \frac{k}{x}$; halving the divisor doubles the result (C2).
10	$P = \frac{k}{r^3}$	Formula (B1); k is the value of Pr^3 (C1).